

CLAIMS

What is claimed is:

- 5 1. A topical pain relief composition comprising:
 a capsaicin fermentation extract; and
 oil.
- 10 2. The composition of claim 1 wherein capsaicin in said extract derives from *Capsicum chinense*.
- 15 3. The composition of claim 1 wherein said fermentation extract comprises capsaicin and volatile, oil soluble fermentation products and by-products.
- 20 4. The composition of claim 1 wherein said oil comprises at least one member selected from the group consisting of vegetable oil, butter, margarine, lard, petrolatum, mineral oil, paraffin, wax, liquid hydrocarbon, semi-solid hydrocarbon, and a combination thereof.
- 25 5. The composition of claim 4 wherein said vegetable oil comprises at least one member selected from the group consisting of corn oil, canola oil, peanut oil, soy oil, palm oil, sesame oil, and a combination thereof.
6. The composition of claim 1 wherein said oil is in a ratio of between approximately 5 and approximately 10,000 parts of said oil to one part of said capsaicin fermentation extract.

7. A yeast culture inoculum for use in a capsaicin fermentation medium for the preparation of a topical pain treatment initially comprising:

a *Capsicum* sp. cultivar in water;

a yeast; and

5 a nutrient mixture comprising at least one nutrient selected from the group consisting of nitrogen, phosphorus, potassium, and a combination thereof.

8. The inoculum of claim 7 wherein said *Capsicum* sp. cultivar comprises 1 part *Capsicum* sp. cultivar to an amount of between approximately 1 and approximately 120 parts water.

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9. The inoculum of claim 8 wherein said *Capsicum* sp. cultivar comprises 1 part *Capsicum* sp. cultivar to an amount of between approximately 10 and approximately 40 parts water.

10. The inoculum of claim 9 wherein said *Capsicum* sp. cultivar comprises 1 part *Capsicum* sp. cultivar to an amount of between approximately 15 and approximately 30 parts water.

11. The inoculum of claim 7 wherein said yeast comprises an amount of between approximately 0.1% and approximately 50% by volume.

20 12. The inoculum of claim 11 wherein said yeast comprises an amount of between approximately 0.1% and approximately 50% by volume.

13. The inoculum of claim 12 wherein said yeast comprises an amount of between approximately 1% and approximately 20% by volume.

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14. The inoculum of claim 7 wherein said nutrient mixture comprises an amount of between approximately 5% and approximately 10% by volume.

15. The inoculum of claim 14 wherein said nutrient mixture comprises an amount of between approximately 1% and approximately 2% by volume.

5 16. The inoculum of claim 7 wherein said nutrient mixture comprises nitrogen, phosphorus and potassium.

17. The inoculum of claim 16 wherein said nutrient mixture comprises approximately 20-20-20 nitrogen-phosphorus-potassium.

10 18. The inoculum of claim 7 wherein said *Capsicum sp.* comprises *Capsicum chinense*.

19. A capsaicin fermentation medium for the preparation of a topical pain treatment comprising:

15 a *Capsicum sp.* cultivar in water;
a carbohydrate;
a yeast culture inoculum; and
a nutrient mixture comprising at least one nutrient selected from the group consisting of nitrogen, phosphorus and/or potassium and a combination thereof.

20 20. The fermentation medium of claim 19 further comprising a second nutrient mixture comprising at least one member selected from the group consisting of calcium, magnesium, iron, zinc and a combination thereof.

25 21. The fermentation medium of claim 20 wherein said second nutrient mixture comprises an amount of between approximately 0.001% and approximately 0.01% by weight.

22. The fermentation medium of claim 19 further comprising a micronutrient mixture comprising at least one member selected from the group consisting of manganese, cobalt, copper, and a combination thereof.

5 23. The fermentation medium of claim 22 wherein said micronutrient mixture comprises an amount of between approximately 0.0001% and approximately 0.01% by weight.

24. The fermentation medium of claim 19 wherein said *Capsicum sp.* cultivar comprises 1 part *Capsicum sp.* cultivar to an amount of between approximately 1 and approximately 120 parts water.

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25. The fermentation medium of claim 24 wherein said *Capsicum sp.* cultivar comprises 1 part *Capsicum sp.* cultivar to an amount of between approximately 2 and approximately 50 parts water.

15 26. The fermentation medium of claim 25 wherein said *Capsicum sp.* cultivar comprises 1 part *Capsicum sp.* cultivar to an amount of between approximately 5 and approximately 10 parts water.

27. The fermentation medium of claim 19 wherein said carbohydrate comprise an amount of between approximately 1% and approximately 40% by weight.

20 28. The fermentation medium of claim 27 wherein said carbohydrate comprise an amount of between approximately 5% and approximately 20% by weight.

25 29. The fermentation medium of claim 28 wherein said carbohydrate comprise an amount of between approximately 10% and approximately 15% by weight.

30. The fermentation medium of claim 19 wherein said yeast culture inoculum comprises an amount of between approximately 0.11% and approximately 50% by volume.

31. The fermentation medium of claim 30 wherein said yeast culture inoculum comprises an amount of between approximately 1% and approximately 20% by volume.

32. The fermentation medium of claim 31 wherein said yeast culture inoculum comprises an 5 amount of between approximately 5% and approximately 10% by volume.

33. The fermentation medium of claim 19 wherein said nutrient mixture comprises an amount of between approximately 0.1% and approximately 10% by volume.

10 34. The fermentation medium of claim 33 wherein said nutrient mixture comprises an amount of between approximately 1% and approximately 5% by volume.

35. The fermentation medium of claim 19 wherein said nutrient mixture comprises nitrogen, phosphorus and potassium.

15 36. The fermentation medium of claim 35 comprises approximately 20-20-20 nitrogen-phosphorus-potassium.

37. The fermentation medium of claim 19 wherein said *Capsicum sp.* comprises *Capsicum* 20 *chinense*.

38. A method for preparing a topical pain relief composition comprising the steps of:

preparing a capsaicin yeast culture inoculum medium;

preparing a capsaicin fermentation medium;

inoculating the fermentation medium with the yeast culture inoculum;

5 incubating the yeast culture in the fermentation medium;

extracting the volatile fermentation products and by-products from the fermentation

medium; and

blending the fermentation volatile fermentation products and by-products into an oil to form a topical pain relief composition.

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39. The method of claim 38 wherein preparing the yeast culture inoculum medium

comprises the steps of:

adding a *Capsicum sp.* cultivar to water to form a mixture;

adding a nutrient mixture comprising at least one nutrient selected from the group

15 consisting of nitrogen, phosphorus, potassium and a combination thereof, to the mixture;

sterilizing the mixture;

cooling the mixture;

adding a yeast to the mixture; and

incubating the mixture.

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40. The method of claim 39 wherein the step of adding the *Capsicum sp.* cultivar comprises

adding 1 part *Capsicum sp.* cultivar to an amount of between approximately 1 and approximately 120 parts water.

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41. The method of claim 41 wherein the step of adding the *Capsicum sp.* cultivar comprises

adding 1 part *Capsicum sp.* cultivar to an amount of between approximately 10 and approximately 40 parts water.

42. The method of claim 41 wherein the step of adding the *Capsicum sp.* cultivar comprises adding 1 part *Capsicum sp.* cultivar to an amount of between approximately 15 and approximately 30 parts water.

5 43. The method of claim 40 wherein the step of adding the yeast comprises adding yeast in an amount of between approximately 0.1% and approximately 50% by volume.

44. The method of claim 43 wherein the step of adding the yeast comprises adding yeast in an amount of between approximately 1% and approximately 20% by volume.

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45. The method of claim 44 wherein the step of adding the yeast comprises adding yeast in an amount of between approximately 5% and approximately 10% by volume.

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46. The method of claim 39 wherein the step of adding a nutrient mixture comprises adding an amount of between approximately 0.1% and approximately 10% by volume.

47. The method of claim 46 wherein the step of adding a nutrient mixture comprises adding an amount of between approximately 1% and approximately 2% by volume.

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48. The method of claim 39 wherein the step of adding a nutrient mixture comprises adding a nutrient mixture comprising nitrogen, phosphorus, potassium and a combination thereof.

49. The method of claim 48 wherein the step of adding a nutrient mixture comprises adding a nutrient mixture comprising approximately 20-20-20 nitrogen-phosphorus-potassium.

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50. The method of claim 39 wherein adding the *Capsicum sp.* comprises adding *Capsicum chinense*.

51. The method of claim 39 wherein the step of sterilizing the mixture comprises autoclaving the mixture.

52. The method of claim 39 wherein the step of incubating the mixture comprises 5 incubating the mixture at a temperature of between approximately 13°C and 45°C.

53. The method of claim 52 wherein the step of incubating the mixture comprises incubating the mixture at a temperature of between approximately 18°C and 40°C.

10 54. The method of claim 39 wherein the step of incubating the mixture comprises incubating the mixture for between approximately 24 and 96 hours.

55. The method of claim 38 wherein preparing the capsaicin fermentation medium comprises the steps of:

15 adding a *Capsicum sp.* cultivar to water to form a solution;
adding a carbohydrate to the solution;
adding a nutrient mixture comprising a member selected from the group consisting of nitrogen, phosphorus, potassium, and a combination thereof;
pasteurizing the fermentation medium; and
20 cooling the fermentation medium.

56. The method of claim 55 further comprising the step of adding a second nutrient mixture comprising members selected from the group consisting of calcium, magnesium, iron, zinc and a combination thereof.

25 57. The method of claim 56 wherein the step of adding the second nutrient mixture comprises adding the second nutrient mixture in an amount of between approximately 0.001% and 0.01% by weight.

58. The method of claim 55 further comprising the step of adding a micronutrient mixture comprising at least one micronutrient selected from the group consisting of manganese, cobalt, copper, and a combination thereof.

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59. The method of claim 58 wherein the step of adding the micronutrient mixture comprises adding the micronutrient mixture in an amount of between approximately 0.0001% and 0.01% by weight.

10 60. The method of claim 55 wherein the step of adding the *Capsicum sp.* cultivar comprises adding 1 part of the *Capsicum sp.* cultivar to an amount of between approximately 1 and 120 parts water.

15 61. The method of claim 60 wherein the step of adding the *Capsicum sp.* cultivar comprises adding 1 part of the *Capsicum sp.* cultivar to an amount of between approximately 2 and 50 parts water.

62. The method of claim 61 wherein the step of adding the *Capsicum sp.* cultivar comprises adding 1 part of the *Capsicum sp.* cultivar to an amount of between approximately 5 and 10 parts water.

20 63. The method of claim 55 wherein the step of adding the carbohydrate comprises adding the carbohydrate in an amount of between approximately 1% to 40% by weight.

64. The method of claim 63 wherein the step of adding the carbohydrate comprises adding the carbohydrate in an amount of between approximately 5% to 20% by weight.

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65. The method of claim 64 wherein the step of adding the carbohydrate comprises adding the carbohydrate in an amount of between approximately 10% to 15% by weight.

66. The method of claim 55 wherein the step of adding the yeast culture inoculum comprises adding the yeast culture inoculum in an amount of between approximately 0.1% to 50% by volume.

5 67. The method of claim 66 wherein the step of adding the yeast culture inoculum comprises adding the yeast culture inoculum in an amount of between approximately 1% to 20% by volume.

10 68. The method of claim 67 wherein the step of adding the yeast culture inoculum comprises adding the yeast culture inoculum in an amount of between approximately 5% to 10% by volume.

15 69. The method of claim 55 wherein the step of adding the nutrient mixture comprises adding the nutrient mixture in an amount of between approximately 0.1% to 10% by volume.

70. The method of claim 69 wherein the step of adding the nutrient mixture comprises adding the nutrient mixture in an amount of between approximately 1% to 5% by volume.

71. The method of claim 55 wherein the step of adding the nutrient mixture comprises adding a nutrient mixture comprising nitrogen, phosphorus, and potassium.

72. The method of claim 71 wherein the step of adding the nutrient mixture comprises adding a nutrient mixture comprising approximately 20-20-20 nitrogen-phosphorus-potassium.

25 73. The method of claim 55 wherein the step of adding the *Capsicum* sp. comprises adding *Capsicum chinense*.

74. The method of claim 38 wherein the step of inoculating the fermentation medium with the yeast inoculum comprises adding an amount of between approximately 0.1% and approximately 50% yeast inoculum by volume.

5 75. The method of claim 74 wherein the step of inoculating the fermentation medium with the yeast inoculum comprises adding an amount of between approximately 1% and approximately 20% yeast inoculum by volume.

10 76. The method of claim 75 wherein the step of inoculating the fermentation medium with the yeast inoculum comprises adding an amount of between approximately 5% and approximately 10% yeast inoculum by volume.

77. The method of claim 38 wherein the step of incubating the yeast in the fermentation medium comprises incubating for between approximately 24 hours and 3 weeks.

15 78. The method of claim 38 further comprising the step of adding additional carbohydrates in incremental doses as fermentation slows until a total of between approximately 3% and approximately 50% have been added.

20 79. The method of claim 38 wherein the step of extracting the volatile fermentation products and by-products from the fermentation medium comprises the steps of:

disposing a layer of oil over the fermentation medium in a ratio of between approximately 1 to approximately 40 parts oil to one part ground *Capsicum* sp.;
heating the oil and fermentation medium; and
25 separating the oil phase from the water phase.

80. The method of claim 79 wherein the step of heating the oil and fermentation medium comprises heating them to a simmering or low boil stage until a water phase has been reduced by an amount of between approximately 20% and approximately 80%.

5 81. The method of claim 38 wherein the step of blending the volatile fermentation products and by-products into an oil comprises blending the fermentation extract containing the volatile fermentation products and by-products into an oil, the oil comprising at least one member selected from the group consisting of vegetable oil, butter, margarine, lard, petrolatum, mineral oil, paraffin, wax, liquid hydrocarbon, semi-solid hydrocarbon, and a combination thereof.

10 82. The method of claim 81 wherein the step of adding the vegetable oil comprises adding at least one oil selected from the group consisting of corn oil, canola oil, peanut oil, soy oil, palm oil, sesame oil, and a combination thereof.

15 83. The method of claim 37 wherein the step of blending the extract into the oil comprises blending one part of the fermentation extract into an amount of between approximately 5 parts and approximately 10,000 parts of the oil.